

## CLAIMS

What is claimed is:

1  
2           1.       A method for providing a path for a new flow between a source node and a  
3       destination node in a network having a plurality of nodes and a plurality of links between the  
4       plurality of nodes, the plurality of nodes including the source node and the destination node,  
5       each of the plurality of links capable of including a plurality of existing flows and having a  
6       capacity, each of the plurality of existing flows including a minimum guaranteed bandwidth,  
7       the method comprising the steps of:

8           (a)       for a node of the plurality of nodes, determining a benefit for each link of a  
9       portion of the plurality of links, the portion of the plurality of links being coupled with the  
10       node, the benefit being determined based on the capacity of the link and the minimum  
11       guaranteed bandwidth for a portion of the plurality of existing flows that is through the link,  
12       the node being a part of the path; and

13           (b)       selecting a link of the portion of the plurality of links to be part of the path,  
14       the link having a maximum benefit for the first portion of the plurality of links, the link  
15       coupling the node with a second node of the plurality of nodes.

1           2.       The method of claim 1 further comprising the steps of:

2           (c)       determining a next node of the plurality of nodes as being a node connected  
3       to the link selected in step (b).

1           3.       The method of claim 1 wherein the benefit is the capacity minus the sum of

2 the minimum guaranteed bandwidth for each existing flow of the plurality of  
3 existing flows through the link.

1 4. The method of claim 2 further comprising the step of:

2 (d) repeating the benefit determining step (a), the link selecting step (b) and the  
3 next node determining step (c) until the destination node is reached.

1 5. The method of claim 3 further comprising the step of:

2 (e) determining a net benefit for the path, the net benefit of the path being the  
3 lowest maximum benefit.

1 6. The method of claim 2 wherein the benefit determining step (a) further  
2 includes the step of:

3 (a1) eliminating a particular link of the portion of the plurality of links if the  
4 benefit for the particular link is less than or equal to zero.

1 7. The method of claim 2 further comprising the step of:

2 (d) determining whether the path between the source node and destination node  
3 can exist; and

4 (e) notifying a user if the path cannot exist.

1 8. A computer-readable medium including a program for providing a path for a  
2 new flow between a source node and a destination node in a network having a plurality of

nodes and a plurality of links between the plurality of nodes, the plurality of nodes including the source node and the destination node, each of the plurality of links capable of including a plurality of existing flows and having a capacity, each of the plurality of existing flows including a minimum guaranteed bandwidth, the program including instructions for:

(a) for a node of the plurality of nodes, determining a benefit for each link of a portion of the plurality of links, the portion of the plurality of links being coupled with the node, the benefit being determined based on the capacity of the link and the minimum guaranteed bandwidth for a portion of the plurality of existing flows that is through the link, the node being a part of the path; and

(b) selecting a link of the portion of the plurality of links to be part of the path, the link having a maximum benefit for the first portion of the plurality of links, the link coupling the node with a second node of the plurality of nodes.

9. A system for providing a path for a new flow between a source node and a destination node in a network having a plurality of nodes and a plurality of links between the plurality of nodes, the plurality of nodes including the source node and the destination node, each of the plurality of links capable of including a plurality of existing flows and having a capacity, each of the plurality of existing flows including a minimum guaranteed bandwidth, the system comprising:

first logic for determining a benefit for each link of a first portion of the plurality of links coupled to a node in the path, the benefit being determined based on the capacity of the link and the minimum guaranteed bandwidth for a portion of the plurality of existing flows that is through the link;

11 second logic for selecting a link of the first portion of the plurality of links to be part  
12 of the path, the link having a maximum benefit for the first portion of the plurality of links;  
13 and

14 a memory coupled with the first logic and the second logic, the memory for storing  
15 an identity of the link.

1 10. The system of claim 9 further wherein the second logic automatically  
2 determines a next node of the plurality of nodes as being a node connected to the link  
3 selected by the second logic.

1 11. The system of claim 9 wherein the benefit is the capacity minus the sum of  
2 the minimum guaranteed bandwidth for each existing flow of the portion of the plurality of  
3 existing flows through the link.

1 12. The system of claim 9 wherein a net benefit for the path is determined, the net  
2 benefit of the path being the lowest maximum benefit.

1 13. The system of claim 10 wherein the first logic further eliminates a particular  
2 link of the first portion of the plurality of links if the benefit for the particular link less than  
3 or equal to zero.

1 14. The system of claim 10 further comprising:  
2 third logic for determining whether the path between the source node and destination node

can exist and for notifying a user if the path cannot exist.